

# SPATIO-TEMPORAL RELATIONSHIPS BETWEEN BREEDING RED-TAILED HAWKS AND GREAT HORNED OWLS IN SOUTH DAKOTA

by

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**ABSTRACT.** Twenty pairs of Red-tailed Hawks and Great Horned Owls which nested at five areas in Clay County, South Dakota, were studied from 1966 to 1971. Great Horned Owl breeding activities were about three weeks earlier than those of Red-tailed Hawks. Great Horned Owls used 17 old Red-tailed Hawk nests, one artificial nest, and on two occasions the same nest twice. Red-tailed Hawks built 19 new nests and one artificial nest. Active Red-tailed Hawk and Great Horned Owl nests when both species were present at the same site were at a distance of 290 to 4,360 feet (88-1329 meters) and averaged 2,070 feet (631 meters). Both species fledged young on 20 occasions.

Studies of intra- and interspecific spatio-temporal relationships between Red-tailed Hawks (*Buteo jamaicensis*) and Great Horned Owls (*Bubo virginianus*) are few. Nest site selection was studied by Baumgartner (1938, 1939), Craighead and Craighead (1956), Hagar (1957), and Smith (1969). Courtship, nesting activities and territoriality were studied by Baumgartner (1939) and Orians and Kuhlman (1956). These authors noted some spatio-temporal relationships between Red-tailed Hawks and Great Horned Owls, but no long-term data were given.

In this paper we present additional data about time and space relationships between Red-tailed Hawks and Great Horned Owls over a six-year period and comment on the use of man-made nests by raptors.

## *Materials and Methods*

The breeding biology of Great Horned Owls and Red-tailed Hawks in Clay County, South Dakota, was studied from 1966 to 1971. During these years, at five general areas, 20 pairs each of Red-tailed Hawks and Great Horned Owls

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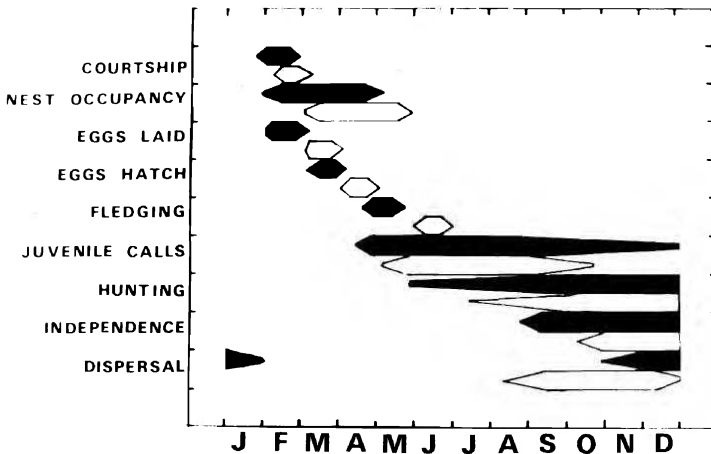
nested in close association in scattered woodlots and gallery forests. The data reported only refer to seasons when both species were present. Data on nest location, occupancy, egg laying, and reproductive success were gathered by direct observation. One artificial nest (24 inches (61 cm) square) made from chicken wire with grass and sticks interwoven to form the sides and bottom, was placed at the location of a broken Red-tailed Hawk nest.

### *Results and Discussion*

Great Horned Owls initiated breeding prior to Red-tailed Hawks. The owls laid eggs around 10 February (earliest 28 January; latest 4 March) (Figure 1). Nestlings hatched about 20 March and fledged about 1 May. Achievement of independence and dispersal of young from the parental territories was not complete until December or January.

Red-tailed Hawks began courtship in mid-February and initiated nest building or repair about 27 February (Figure 1). Eggs were laid between 10 and 20 March and hatched about 15 April. Nestlings left their nests for the first time in early June and dispersed from the parental territories in late September and October. Adults of both species remained close to the nest sites all year.

Great Horned Owls fledged and seldom returned to the nest. Red-tailed Hawks "branched" and utilized the nests for feeding. They remained close to



**Figure 1.** Chronology of annual events of breeding Great Horned Owls (filled bars) and Red-tailed Hawks (open bars) in South Dakota.

their nests for six to eight weeks after fledging. Adult and fledgling Great Horned Owls roosted in the canopy during the day for about two weeks after fledging and thereafter roosted on the ground. Red-tailed Hawks used the upper and mid-canopy for both daily activities and night roosting throughout the summer.

Red-tailed Hawks nested in mature cottonwood (*Populus sargentii* L.) and ash (*Fraxinus* sp.) trees. Nests were built in the middle or upper canopy of the taller trees and averaged 63 feet (19.2 meters, range 42 to 81 feet, 12.8 to 24.7 meters) above the ground. Great Horned Owls commonly nested in old Red-tailed Hawk nests. None built their own nests. Great Horned Owl preference for Red-tailed Hawk nests has been mentioned by Baumgartner (1938), Errington (1932) and Orians and Kuhlman (1956). Red-tailed Hawks built 19 new nests on 20 occasions. On two occasions the previous year's nest was available, but was not used. A pair once used an artificial nest. Great Horned Owls occupied 17 different old Red-tailed Hawk nests out of 20 nestings. Two pairs of owls used nests for two years in succession. Another pair used the artificial nest mentioned above—the same year it was built!

The spatial relationships between 20 active Red-tailed Hawk and Great Horned Owl nests at five locations are shown in Figures 2-6. Distances between nests were from 290 to 4,360 feet (Table 1) and averaged 2,070 feet (88-1329 meters, average 631 meters).

At these five areas when both species were present, 20 nests of each were successful with average productivity of 2.35 young per nest of Red-tailed Hawk and 2.05 young per nest of Great Horned Owl. Since these areas were selected for the presence of both species these figures do not represent the productivity in the region. In contrast to these observations are the findings of Craighead and Craighead (1956) who had no cases of Red-tailed Hawks and Great Horned Owls successfully fledging young when nesting closely. They credit Great Horned Owls with destroying Red-tailed Hawk nests. Smith (1969) found an active

**Table 1.** Distances between active Red-tailed Hawk nests and Great Horned Owl nests in five areas in South Dakota in feet (meters in parentheses).

| Year | Area No. 4     | Area No. 5     | Area No. 6      | Area No. 7   | Area No. 16     |
|------|----------------|----------------|-----------------|--------------|-----------------|
| 1970 | 2,280<br>(695) | 1,230<br>(375) | 4,290<br>(1308) | 450<br>(137) | 3,700<br>(1128) |
| 1969 | 2,640<br>(805) | 480<br>(146)   | 4,360<br>(1329) | 450<br>(137) | 3,700<br>(1128) |
| 1968 | 2,530<br>(771) | 2,090<br>(637) | 4,290<br>(1308) | 290<br>(88)  | 3,700<br>(1128) |
| 1967 |                | 870<br>(265)   |                 | 590<br>(180) | 2,100<br>(640)  |
| 1966 |                | 700<br>(213)   |                 | 500<br>(152) |                 |

Red-tailed Hawk nest on a ledge within 25 yards of an active Great Horned Owl nest in a cave and both nests failed and were abandoned during the incubation period. The senior author saw two adult Red-tailed Hawks stoop on and strike two different fledgling Great Horned Owls that were chased up from day roosts and flew across open fields but both owls survived.

**Artificial Nest Use.**—In the fall of 1969 one artificial nest was placed at the exact site of a broken Red-tailed Hawk nest built in 1968 and used and destroyed by Great Horned Owls in the spring of 1969 (Dunstan 1970). In 1970 Red-tailed Hawks fledged three young from this nest and in 1971 Great Horned Owls fledged two young from it.

Artificial platform nests can be used to attract certain species of raptorial birds to specific locations as has been shown for Ospreys (*Pandion haliaetus*) (Rhodes, 1972). We suggest that artificial nests can be used to increase productivity by placing them in locations that minimize conflicts with antagonistic species, including man. Artificial nests also provide strong nesting sites for spe-

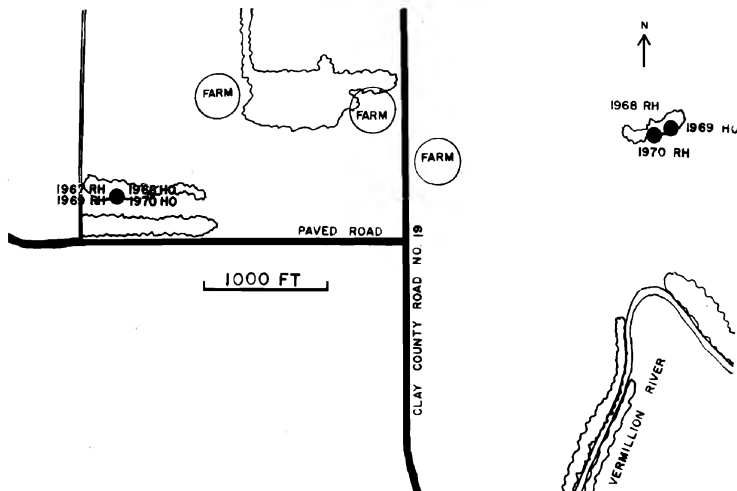


Figure 2. Area 4, 1967-1970, corn fields.

Figures 2-6. Great Horned Owl—Red-tailed Hawk nest site selection. Woods are outlined and surrounded by fields.

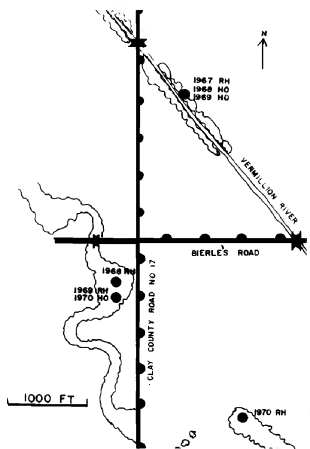


Fig. 3. Area 5, 1967-1970; corn fields and pasture west.

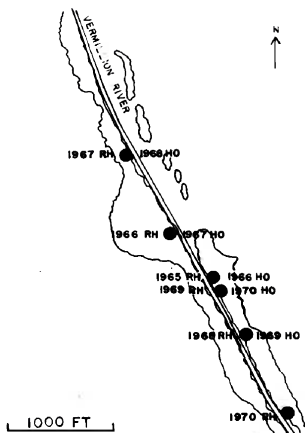


Fig. 4. Area 6, 1967-1970; corn fields.

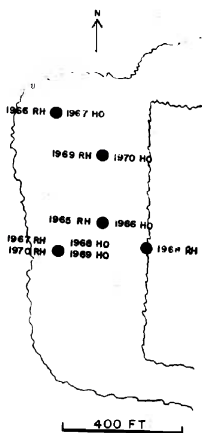


Fig. 5. Area 7, 1965-1970, alfalfa fields.

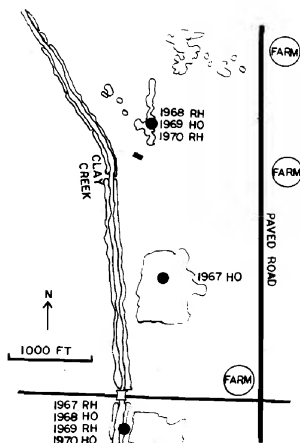


Fig. 6. Area 16, 1967-1970; corn field west of creek, pasture and alfalfa east.

cies such as owls that do not build or repair nests. In states like Minnesota where there are numerous all-terrain vehicles (300,000 snowmobiles were present in 1973) being operated during the egg laying and incubation period for Great Horned Owls and Bald Eagles (*Haliaeetus leucocephalus*), one could use artificial nests to attract breeding birds away from openings and edges such as fields and lake shores that are most often used by snowmobile operators. Dunstan and Borth (1970) showed that even Bald Eagles will tolerate artificial nests to some extent. Whether or not one can attract breeding eagles to new locations has yet to be proven.

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